WHAT IS CLAIMED IS:

1. A method for forming an aluminide or chromide coating on a turbine engine rotor component, the method comprising the steps of:
   (a) depositing an aluminum or chromium coating on the surface of the component; and
   (b) heating the coated component in a nonoxidizing atmosphere to a temperature of from about 500°C to about 800°C to form an aluminide or chromide coating on the surface of the component.

2. The method of claim 1 wherein the rotor component is a compressor or turbine disk.

3. The method of claim 1 wherein the rotor component is a compressor or turbine seal element.

4. The method of claim 1 wherein the rotor component has a service operating temperature of from about 540°C to about 815°C.

5. The method of claim 1 wherein the aluminum or chromium coating is deposited by metal organic chemical vapor deposition.

6. The method of claim 1 wherein the aluminum or chromium coating has a thickness of from about 0.2 to about 50 microns.

7. The method of claim 6 wherein the coating has a thickness of from about 0.5 to about 3 microns.

8. A method for protecting a turbine engine rotor component, comprising the steps of:
   (a) providing a rotor component selected from the group consisting of compressor and turbine disks and seal elements;
   (b) depositing an aluminum or chromium coating on the rotor component by metal organic chemical vapor deposition, the coating having a thickness of from about

0.2 to about 50 microns; and

(c) heating the coated component in a nonoxidizing atmosphere to a temperature of from about 500°C to about 800°C to form an aluminide or chromide coating on the surface of the component.

9. The method of claim 8, wherein the rotor component has a service operating temperature of from about 540°C to about 815°C.

10. The method of claim 8, wherein the coating has a thickness of from about 0.5 to about 3 microns.

11. A method for forming an aluminide or chromide coating on a turbine engine rotor component, the method being conducted in a vapor coating container having a hollow interior coating chamber, the method comprising the steps of:

(a) loading the coating chamber with the component to be coated;

(b) heating the loaded coating chamber to a temperature of from about 240°C to about 700°C;

(c) flowing a tri-alkyl aluminum or chromium carbonyl coating gas into the heated coating chamber at a pressure of from about 50 to about 2000 mtorr (about 0.68 to about 27 kgf/m^2 for from about 0.25 to about 4 hours to deposit an aluminum or chromium coating on the surface of the component; and then

(d) heating the coated component in a nonoxidizing atmosphere to a temperature of from about 500°C to about 800°C to form an aluminide or chromide coating on the surface of the component.

12. The method of claim 11 wherein the coating gas is a tri-C_3-C_5 alkyl aluminum or chromium carbonyl gas.

13. The method of claim 12 wherein the coating gas is tri-butyl aluminum or chromium hexacarbonyl gas.

14. The method of claim 11 wherein during step (b), the loaded coating chamber is heated

at a temperature of from about 250°C to about 300°C when tri-alkyl aluminum coating gas is flowed into the chamber during step (c), and is heated at a temperature of from about 350°C to about 600°C when chromium carbonyl coating gas is flowed into the chamber during step (c).

15. The method of claim 14 wherein during step (c), the coating gas is flowed at a pressure of from about 250 to about 700 mtorr (about 3.4 to about 9.5 kf/m^2) for from about 0.5 to about 2 hours.

16. The method of claim 15 wherein the coating gas is tri-C_3-C_5 alkyl aluminum or chromium hexacarbonyl gas.

17. The method of claim 16 wherein during step (d), the coated component is heated in a vacuum to a temperature of from about 640°C to about 700°C.

18. The method of claim 11 further comprising a step (e) of maintaining the component at a temperature of from about 450°C to about 800°C in the presence of oxygen to form an oxide coating on the surface of the component.

19. The method of claim 18 wherein the temperature during step (e) is from about 600°C to about 700°C.

20. The method of claim 17 further comprising a step (e) of maintaining the component at a temperature of from about 600°C to about 700°C in the presence of oxygen to form an oxide coating on the surface of the component.

21. A method for forming an oxide coating on a turbine engine rotor component, the method being conducted in a vapor coating container having a hollow interior coating chamber, the method comprising the steps of:

(a) loading the coating chamber with the component to be coated;

(b) heating the loaded coating chamber to a temperature of from about 250°C to about 600°C;

(c) flowing a tri-C_2-C_5 alkyl aluminum or chromium hexacarbonyl coating gas into the heated coating chamber at a pressure of from about 250 to about 700 mtorr (about 3.4 to about 9.5 kgf/m^2) for from about 0.25 to about 4 hours to deposit an aluminum or chromium coating on the surface of the component;

(d) heating the coated component in a nonoxidizing atmosphere to a temperature of from about 600°C to about 700°C to form an aluminide or chromide coating on the surface of the component; and then

(e) heating or maintaining the component at a temperature of from about 600°C to about 700°C in the presence of oxygen to form an oxide coating on the surface of the component.

22. The method of claim 21 wherein the coating gas is tri-butyl aluminum or chromium hexacarbonyl gas.

23. The method of claim 21 wherein during step (c) the coating gas is flowed at a pressure of from about 450 to about 550 mtorr (about 6.1 to about 7.5 kgf/m^2) for from about 0.5 to about 2 hours.

24. The method of claim 23 wherein during step (d) the coated component is heated to a temperature of from about 640°C to about 700°C for from about 2 to about 8 hours.

25. A turbine engine rotor component comprising:

(a) a metal-based substrate; and

(b) an aluminide or chromide coating on the surface of the substrate.

26. The rotor component of claim 25 that is a compressor or turbine disk.

27. The rotor component of claim 25 that is a compressor or turbine seal element.

28. The rotor component of claim 25 wherein the aluminide or chromide coating is formed by depositing an aluminum or chromium coating by metal organic chemical vapor deposition, and heating the coated component in a nonoxidizing atmosphere to a temperature of from about 500°C to about 800°C to form an aluminide or chromide coating on the surface of the substrate.

29. The rotor component of claim 25 wherein the aluminide or chromide coating has a thickness of from about 0.2 to about 50 microns.

30. The rotor component of claim 29 wherein the coating has a thickness of from about 0.5 to about 3 microns.

31. The rotor component of claim 25 further comprising an oxide coating on the surface of the component.